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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO. KM
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EXAMINER

ART UNIT	PAPER NUMBER
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1623 6
DATE MAILED: 01/30/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/623,414

Applicant(s)

COSTANTINI ET AL.

Examiner

Mahreen Chaudhry

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____
- 18) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: ____

DETAILED ACTION

Claim Objections

1. Claim 5 is objected to because of the following informalities: the word "of" from the phrase "of the solvent" in the last line of the claim should be deleted. Appropriate correction is required.
2. Claim 12 is objected to because of the following informalities: the phrase, "the Periodic Classification of the Elements," may need to be replaced with the conventional term, "the Periodic Table of Elements". Appropriate correction is required.
3. Claim 15 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim, or amend the claim to place the claim in proper dependent form, or rewrite the claim in independent form. Claim 13 is directed to a process of purification by treatment with nitric acid. Claim 15 is directed to the process of claim 13 with the only recited limitation being that the process be carried out "in the absence of catalyst or in the presence of a catalyst." Since the only limitation provided by claim 15 is that the process be conducted either in the presence of or in the absence of a catalyst, claim 15 does not further limit claim 13.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claim 1, 5 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the diacids formed" in line 7 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Regarding claim 1, the phrase "making it possible to" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 5 is unclear with regard to the phrase, "most of the unconverted cyclohexane." It is unclear what specific quantity of cyclohexane is encompassed by the term, "most."

Claim 14 is unclear with regard to the phrase, "for a period of time of a few minutes to a few hours." It is unclear what specific amount of time is encompassed by this limitation.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-10, 13-15 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,900,506 issued to Fache et al. filed in December 1997 in view of BE 855237A. Fache et al. disclose a process for treating a reaction mixture obtained by direct

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oxidation of cyclohexane to adipic acid by molecular oxygen in an aliphatic carboxylic acid in the presence of a catalyst containing cobalt (Column 1 Lines 47+). Fache et al. disclose that the reaction mixture settles into two liquid phases in which the upper phase comprises cyclohexane and the lower phase comprises the diacids formed, the catalyst, the solvent and other reaction products (Column 2, Lines 32-38). Fache et al. further teach that the cyclohexane phase obtained after settling may be reintroduced in the cyclohexane oxidation operation (Column 2, Lines 39-41). Fache et al. further disclose distillation of the lower phase at a temperature between 25°C and 250°C and at a pressure between 10 Pa and atmospheric pressure such that the cyclohexane and the solvent are separated from adipic acid (Column 2, Lines 3-6; Lines 44-45). Fache et al. additionally teach the separation of the catalyst by liquid-liquid extraction using cyclohexane or by membrane electrodialysis (Column 2, Lines 64-67; Column 3, Lines 1-11, 43-47). Fache et al. also disclose that adipic acid can be crystallized and recrystallized from the aqueous solution (Column 3, Lines 30-35).

Fache et al. do not specifically disclose conducting a reducing or oxidizing purification treatment of the adipic acid in aqueous solution. However, purification of adipic acid by both reducing and oxidizing treatments are well-known. BE 855237A discloses a process for the purification of adipic acid by the addition of 40-65% nitric acid at a temperature between 100 and 140°C in the presence of copper catalysts. BE 855237A further discloses that this purification may be followed by treatment with activated carbon. It would therefore have been obvious to one having ordinary skill in the art to have treated the reaction mixture according to the process of Fache et al. in order to remove the catalyst, side products and reaction products

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and to have treated the adipic acid with nitric acid and activated carbon before crystallization in order to have further increased the purity of the desired product.

8. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fache et al. in view of BE 855237A as applied to claims 1-10, 13-15 and 19-20 above, and further in view of both JP 71002802B and JP 81006975B. BE 855237A teaches a method for the purification of adipic acid by treatment of nitric acid but does not expressly disclose the purification of adipic acid by oxidation. However, oxidation treatment using oxygen containing gases or hydroperoxides are known methods for the purification of adipic acid. JP 71002802B discloses a process for the purification of adipic acid by treatment with an oxygen containing gas, preferably air. JP 81006975 discloses the purification of adipic acid by the addition of hydrogen peroxide. It would therefore have been obvious to one having ordinary skill in the art to have purified adipic acid according to the method of Fache et al. and to have further purified adipic acid using known methods including oxidation with either air or hydrogen peroxide. In addition, it would have been obvious to have conducted the oxidation using any appropriate catalyst.

9. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fache et al. in view of BE 855237A as applied to claims 1-10, 13-15 and 19-20 above, and further in view of U.S. Patent 3,933,930 issued to Dougherty et al. Neither Fache et al. nor BE 855237A discloses the purification of adipic acid by hydrogenation. However, Dougherty et al. disclose the hydrogenation of a reaction mixture containing adipic acid in order to remove impurities (Column 7, Lines 10-44). Dougherty et al. teach that hydrogenation is conducted using hydrogen and catalysts such as platinum, palladium and cobalt (Column 7, Lines 49-52). It would therefore have been obvious to one having ordinary skill in the art to have treated the

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adipic acid reaction mixture according to the method of Flache et al. and to have further purified the adipic acid using known purification methods including hydrogenation, as taught by Dougherty et al.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,463,119 issued to Kollar discloses a process for the treatment of an adipic acid obtained by direct oxidation of cyclohexane. Kollar et al. discloses that the reaction mixture separates into two phases and that cyclohexane containing phase can be recycled for oxidation.

JP 73016902B discloses a process for the purification of adipic acid by contacting an aqueous solution of adipic acid with an ozone containing gas followed by crystallization of the adipic acid.

JP 55024153A discloses a process for the purification of adipic acid by oxidation with nitric acid, washing with water, treatment with activated carbon and recrystallization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahreen Chaudhry whose telephone number is (703) 605-1200. The examiner can normally be reached on Monday – Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Geist, can be reached on (703) 308-1701. The official fax phone number for the organization where this application is proceeding or assigned is (703) 308-4556 or 308-4242.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

mc

January 22, 2001

A handwritten signature in cursive script, appearing to read "Paul Hiltner".

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